

The lectotype for the Asian elephant, *Elephas maximus* Linnaeus, 1758 (Mammalia, Proboscidea) and comments on ‘primary, secondary and tertiary syntypes’ and ‘virtual lectotype designation’

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Last November a group of colleagues and ourselves designated a lectotype for the Asian elephant, *Elephas maximus* Linnaeus, 1758, having used morphology and genetic and proteomic sequencing to confirm that Linnaeus's syntypes included both Asian and African elephants. The article was published (Cappellini et al., 2013) online in the *Zoological Journal of the Linnean Society*, together with eight items of Supplementary Information, and appeared on paper in the *ZJLS* in January 2014. The paper and SI items are available online at DOI:10.1111/zoj.12084.

The lectotype is a very nearly complete mounted skeleton on display in the Natural History Museum of the University of Florence. John Ray described the specimen in 1673 and 1693 and Linnaeus cited Ray's 1693 publication. The lectotype designation is available and valid. Dubois, Nemésio & Bour, however, have criticised our choice of selected specimen (published in *Bionomina*, June 2014; a preview is available online at <http://mapress.com/bionomina/content.htm>). We are concerned because they have demonstrated misunderstanding or ignorance of a number of aspects of the *International Code of Zoological Nomenclature*.

To begin, we should like to set the record straight on the date of publication of our lectotype designation. Dubois et al. (2014, p. 46, footnote), writing on 21 November 2013, postulated that the designation would become available only with the publication of the paper version of the *Zoological Journal of the Linnean Society*. This is incorrect. Our paper was registered with ZooBank on 10 October 2013 and given



Female lectotype of the Asian elephant, *Elephas maximus* Linnaeus, 1758 in the Natural History Museum of the University of Florence, specimen no. MZUF 734. John Ray and Philip Skippon studied the skeleton (and at the time the skin) in 1664. Photograph: Marco Ferretti, NHM, Florence.

a registration number. This number was cited when the article was published online by the *ZJLS* on 4 November 2013. An archive for the electronic publication was included in the ZooBank registration on 4 December 2013, thereby completing the procedure for recognition of online publication, and the lectotype designation became available from this date (Article 8.5 of the Amended Code, 2012).

Dubois et al. (2014, pp. 47–48, 54–57) have set up their own system of three categories of syntype. There is nothing, however, in the Code that allows a hierarchy of primary, secondary and tertiary syntypes. We noted in the Introduction to our article that all syntypes, whether cited as specimens or by bibliographic references, whether or not they were examined by the author and whether or not they still exist, are of equal standing. Article 73.2 of the Code states ‘When a nominal species-group

taxon has syntypes, all have equal status in nomenclature as components of the name-bearing type'. There is, of course, absolutely no hierarchy in the choice of a lectotype from among the syntypes.

Dubois et al. (p. 53) noted Linnaeus's (1758) observation that *Elephas maximus* lived on Zeylon (Ceylon, Sri Lanka) and asserted that 'for this reason this island has always been considered to be the type-locality of the species (e.g. Shoshani 2005). It would then be appropriate to designate a lectotype originating clearly from this island to maintain the tradition'. However, Ceylon is only part of the original type locality for *maximus* and this is not because of what Linnaeus wrote but because it is the place of origin of one of the syntypes. Article 73.2.3 states '... if the syntypes originated from two or more localities (including different strata) the type locality encompasses all of the places of origin'.

Linnaeus (1758) did not separate African and Asian elephants and, citing references to Aldrovandi (1616), Gesner (1620), Johnston (1650), Ray (1693), Strachan (1702) and Seba (1734), he included both species under the one name. Therefore the type locality for *Elephas maximus* was both Africa and Asia and included Ceylon because Strachan mentioned a specimen from there. Following publication of the name *E. africanus* Blumenbach, 1797 for the African elephant, the name *maximus* was retained for the Asian elephant, but the appearance of Blumenbach's paper did not in itself change the pre-existing type locality for *maximus*. It is only with our very recent designation of the *maximus* lectotype that at last a restricted type locality has been fixed. Article 73.2.3 goes on to state 'If a lectotype is subsequently designated, the type locality is the place of origin of the lectotype' and Article 76.2 adds 'The place of origin of the lectotype becomes the type locality of the nominal species-group taxon, despite any previously published statement of the type locality'.

It is as certain as anything can be from the written records of the past that the elephant in the Natural History Museum of the University of Florence, now the *Elephas maximus* lectotype, came from Sri Lanka. In 1983 the art historian D. Heikamp, in his study of the original collection in the Uffizi Gallery, noted that the elephant reported in various 17th and early 18th century documents was that observed by Ray in 1664. Heikamp (pp. 532–533, footnote 160) cited four sources (Del Migliore, MS, post 1655; Skippon 1732; Ray, 1673; and Targioni Tozzetti, MS, 1763). He wrote as follows: F. DEL MIGLIORE, *Lo Zibaldone*, BCNF: 'Vi è in questa Galleria uno scheletro d'un grand'elefante il quale nacque l'anno 1630 nell'Isola Celonica, che è nell'Indie Orientali, condotto in Firenze e mostrandovi con gran curiosità al popolo, quivi morì non confacendogli il clima, né l'aria di questo paese differente molto al suo natio l'anno 1655. Era di lunghezza B. 11 e d'altezza B. 8. Fu pesato in Vienna alla presentia dell'Imperatore Federico III e fu libbre 6600. Dicono che questo animale cresce fino a 100 anni e vive fino a 300'. P. SKIPPON, *An account* cit., p. 651 sg.: 'In one room is the skin of a young elephant, which was alive about six years since; it cost the duke 100 pistoles'. Segue un'attenta descrizione dello scheletro e, ancora, J. RAY, *Observations* cit., p. 334: 'the skin and skeleton [sic] of an Elephant, which was shown in Florence some 8 od [sic] 10 years ago, and died there'; G. TARGIONI TOZZETTI, *Catalogo* cit., I, *Animali e loro parti*, p. 27 sg., nn. 1 e 2: 'Il cuoio intero di un elefante giovine delle razza piccola il quale morì in Firenze verso la fine del secolo passato [...] Lo scheletro del medesimo elefante ben pulito e congegnato con grossi fili di ferro e sostenuto ritto da spranghe di ferro [...]

Tanto la stampa, o sia cuoio ripieno, che lo scheletro di questo elefante si conservano nello stanzone detto delle Pietre della Imperial Galleria'. Per quanto ci risulta i resti dell'elefante non esistono più. L'elefante morto fu ritratto da Stefano Della Bella in un disegno su cui è scritto: «Elefante morto in Firenze adì 9 di novembre 1655», cfr. A. Bertini, *I disegni italiani della Biblioteca Reale di Torino*, Roma, Istituto Poligrafico dello Stato 1958, n. 545 e cfr. inoltre W. S. Heckscher, *Bernini's Elephant and Obelisk*, «The Art Bulletin», XXIX, 1947, p. 168 nota 64.

We included a translation of Del Migliore's text in the online Supplementary Information S7 of our article: 'In this Gallery there is the skeleton of a big elephant born in 1630 on the Ceylon Isle, Eastern Indies, brought to Florence and here exhibited raising great curiosity. It died here in 1655 because the weather and the air of this country, much different from those of its place of origin, were inadequate for it. It was 11 B. long and 8 B. tall. It weighed 6600 lbs., and was measured in Vienna in front of the Emperor Frederick the Third. People say this animal grows until it is 100 years old and can live 300 years'.

Del Migliore (1628–1696) was a historian, writer and scholar who chronicled events contemporary with the elephant. It is likely that he saw the animal alive and that his report derived from his direct observations. The data Del Migliore gave on the birth date (1630) and origin (Ceylon) of the elephant most likely derived from Dutch documentation when the animal arrived in Europe, probably Amsterdam in 1633 (Supplementary Information S7). In 1633, Ernst Brinck, Mayor of Hardewijk, reported that he had seen the elephant, that it came in ships into Amsterdam, and that he was told by its keeper that three years earlier the animal had been born in Ceylon: Anno 1633 is met de oostIndischen schepen in Hollandt gekomen een elephant, die ik anno dito te Amsterdam oeck gesien hebbe met mijn sohne Ludovico, die oeck daerop gereden heeft. Desen elephant was doenmaels olt ontrent 3 iahren, was hooch 7 van mijne voeten; was gegeniert int Eijlandt Ceijlon, ende, gelijk den bestierder verhaelde, soo was sijn moeder hooch 17 voet ende een halven. Brinck's report is corroborated by early modern engravings, including a work done in 1652 by Jeremias Glaser; here the elephant is shown wielding a sword and doing other tricks, and the legend clearly indicates the animal was from Ceylon: diser Elephant. ist .1630. uf der. Insel Selon in India (repeated in Slatkes, 1980).

On reading the article by Dubois et al. it is apparent that they have substantially misunderstood the circumstances of our lectotype designation and have inflated them into an unnecessary problem. Our specimen was selected with great care having followed the historical trail from Ray to the Florence skeleton and having assessed its morphology. Its identity as an Asian elephant was corroborated by genetic analysis but this was not the main species-identifying factor used in our paper. We sequenced the mitochondrial DNA of the specimen primarily in the hope that it might reveal a haplotype unique to a particular geographical region (this proved not to be the case). We believe that all possible methods, involving history, morphology and genetics, can be employed in the identification and description of all zoological specimens and particularly those chosen as name bearers. The genetic and proteomic data that we produced were very important in the case of Seba's foetus, contrary to Dubois et al.'s assertion. While earlier authors had suggested the foetus as African based on external morphology, this was essentially restricted to two characters – the shape of the ear and trunk-tip – and none of these authors adduced a comparative study of African

and Asian elephant foetuses. The Seba foetus is far from full-term and allometric effects could be misleading. The genetic and proteomic data provided unambiguous identification allowing us to confidently exclude the foetus as a potential lectotype for the Asian elephant.

The Florence lectotype skeleton is very nearly complete and is readily accessible for study. Its identity as an Asian elephant and, indeed, that seen and described by Ray, is beyond doubt. Surprisingly, Dubois et al. have written that they would have preferred a non-existent specimen from Sri Lanka as the lectotype (their 'virtual lectotype'), followed by the possible designation of a neotype. They consider that a specimen mentioned by Strachan (1702), in a work cited by Linnaeus (1758), would have been a more suitable lectotype. Strachan, however, described the capture and taming of herds of elephants and his note of an individual specimen lacks provenance details. It was in captivity and had been presented to the Dutch by the king of Kandy whose kingdom did not overlap Dutch territory. Hence its source locality could scarcely be that quoted by Dubois et al. from Strachan. Even the Asian elephant depicted by Jonston (1650), in a work also cited by Linnaeus, would make a better lectotype than Strachan's specimen.

It is clearly desirable to have a type specimen to hand and the designation of a non-existent lectotype would not be helpful. Dubois et al. have omitted to say how they would set about finding a suitable neotype specimen, particularly one with a known and restricted locality. There are specimens in museums but in these circumstances we would again have to accept as accurate label and catalogue identifications that may or, in reality, may not be correct. We would then need to morphologically and genetically confirm the identity of a chosen specimen. This was the position at the beginning of our study, and the advantage over our lectotype is not evident. A neotype designation would have the added disadvantage that the direct connection to Linnaeus and one of his syntypes (and an excellent specimen) would unnecessarily have been lost.

Designation of a neotype is subject to the conditions of Article 75. An author must give 'reasons for believing that the name-bearing type specimen(s) (i.e. a holotype or lectotype, or all syntypes, or prior neotype) to be lost or destroyed, and the steps that have been taken to trace it or them' (Article 75.3.4) and is 'advised to choose neotypes from any surviving paratypes or paralectotypes unless there are compelling reasons to the contrary' (Recommendation 75A). This means that, in designating a neotype, any other original type material should not simply be ignored, as advocated by Dubois et al. In the case of the Asian elephant both the skeleton in Florence and the partial tooth in Uppsala (Supplementary Information S8) are extant syntypes and were suitable as name-bearing specimens in accordance with the strong terms in which Recommendation 75A is expressed.

Dubois et al. have noted that we cited the illustration of an African elephant in Gesner's *Historiae Animalium* with the date 1551. Gesner's work was published in various formats but the images remained unchanged even as late as the 1620 Frankfurt reprint. Heller (2007) recorded that in Linnaeus's publications 'Refs. cite synonyms and pages (usually for a nearby fig.), more often of 1620 than 1551, but the figs. can be found in any edn.'

Finally, we point out that the Code is not an anonymous work. On page iv and in Article 85 is the statement 'The author of this Code is the International Commission

on Zoological Nomenclature'. The Code was established to provide stability in zoological nomenclature and a common set of rules ensuring consistency of approach across the international taxonomic community. It has become more comprehensive with time as new problems have come to light from the actions of past generations of taxonomists. Changes are discussed and decided democratically with the whole community. It is, above all, a practical manual and the very last thing needed is a theoretical and complicated system replete with pointless new terminology ('onymophoront' for type specimen, etc.) as advocated by Dubois et al.

References

- Brinck, E.** 1633. *Municipal Archives of Hardewijk*, inventory number 2058, fol. 7r.
- Cappellini, E., Gentry, A., Palkopoulou, E., Ishida, Y., Cram, D., Roos, A.-M., Watson, M., Johansson, U.S., Fernholm, B., Agnelli, P., Barbagli, F., Littlewood, D.T.J., Kelstrup, C.D., Olsen, J.V., Lister, A.M., Roca, A.L., Dalén, L. & Gilbert, M.T.P.** 2013. Resolution of the type material of the Asian elephant, *Elephas maximus* Linnaeus, 1758 (Proboscidea, Elephantidae). Published online by the *Zoological Journal of the Linnean Society* on 4 November 2013; published in the *ZJLS*, **170**(1): 222–232, January 2014.
- Dubois, A., Nemésio, A. & Bour, R.** 2014. Primary, secondary and tertiary syntypes and virtual lectotype designation in zoological nomenclature, with comments on the recent designation of a lectotype *Elephas maximus* Linnaeus, 1758. *Bionimina*, **7** : 45–64.
- Glaser, J.** 1652. 20 x 33.2 cm met het opschrift: *diser Elephant. ist .1630. uf der. Insel Selon in India. jung Worden. Sein grade hööhe ist .9. schu. das ohr .1. schu breit und lang. die dicke des leibs .20. schu. er wiegt über 70 Centner. und kan merdan. 36. schöne kunststück als hier theils zu sehen seind. und höclich zur verwunderung. die grosse Allmacht Gottes uns menschen vor die augen stelt. / Jeremias Glaser fe: ad Viv: den 19. febr. Bas: 1652.* Collectie dr. I. Faust, nr. 138. Handschriftenabteilung, Bayerische Staatsbibliothek, München; I. Faust, *Zoologische Einblattdrucke und Flugschriften vor 1800*, 2 (Stuttgart 2002), nr. 665 (p. 346).
- Heikamp, D.** 1983. La Galleria degli Uffizi descritta e disegnata. Pp. 461–541 in Barocchi P. & Ragionieri G. (Eds.), *Gli Uffizi quattro secoli di una galleria, Atti del Convegno internazionale di studi (Firenze 1982)*. Firenze.
- Heller, J.L.** 2007. (Penhallurick, J.M., Ed.). *Index of the books and authors cited in the zoological works of Linnaeus (Index librorum et auctorum in operibus zoologicis Linnaei citatorum)*. xlix, 174, liii-lxiii pp. Publication no. 168. Ray Society, London.
- Jonston, J.** 1650. *Historiae naturalis de quadrupedibus liber 1. De quadrupedibus Solipedibus*. Marianus, Frankfurt.
- Ray, J.** 1673. *Observations topographical, moral, and physiological made in a journey through part of the Low-Countries, Germany, Italy, and France*. Martyn, London.
- Ray, J.** 1693. *Synopsis methodica animalium quadrupedum et serpentine generis*. [14], 336, [9]. Smith & Walford, London.
- Seba, A.** 1734. *Locupletissimi rerum naturalium thesauri . . .*, vol. 1. Amsterdam.
- Skippon, P.** 1732. An account of a Journey Made Thro' Part of the Low-Countries, Germany, Italy, and France, vol. 6, pp. 359–736 in Churchill, A. & J. (Eds.), *A collection of voyages and travels*, John Walthoe et al., London.
- Slatkes, L.J.** 1980. Rembrandt's Elephant. *Simiolus: Netherlands Quarterly for the History of Art*, **11**(1): 7–13.
- Strachan, Mr.** 1702. An account of the taking and taming of elephants in Zeylan, by Mr Strachan, a physician, who lived 17 years there. *Philosophical Transactions of the Royal Society*, **233**(277): 1051–1054.
- Targioni Tozzetti G.** 1763. *Catalogo delle produzioni naturali che si conservano nella Galleria Imperiale di Firenze, disteso nell'anno 1763*. Università degli Studi di Firenze, Istituto di Botanica, MS 76 (3 vols.).